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ABSTRACT

Vocational Literacy is a new academic field which has arisen in response to criticism from industry that vocational graduates are not sufficiently literate to perform on the job. South Seattle Community College (SSCC) in Washington has investigated the feasibility of coordinating courses in computer literacy with English and technical courses to create a three-way coordinated curriculum in workplace literacy. The feasibility study considered which technical, English, and computer courses should be coordinated; how English could be coordinated with computer and technical courses; what should be taught in the English courses; what techniques should be used to assess English skills for initial and ongoing placement in selected courses; what teacher qualifications would be required for these courses; and what kinds of teacher development programs would be necessary to support these courses. The coordination of writing courses with computer courses has been explored in ICT (Industrial Computing Technology) 115, "Computer Aided Writing." The course was designed to teach technical students to find, organize, and effectively communicate business-related information to a typical business audience. The course takes place in a classroom with one computer per student and is organized into five overlapping phases: document design, document production, assessment and goal setting, practice and remediation, and reference and research. ICT-115 is still evolving, but the course seems to have partially met the goal of capturing the interest and imagination of technical students in writing with emerging technology. (PAA)

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ED 405 012

Part III

Transferring Emerging Technology

from:

ICT-115 "Computer Aided Writing"

to:

A Three-Way Coordinated Program in Vocational Literacy

prepared by:

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South Seattle Community College
Seattle, Washington

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September 1991

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INTRODUCTION

This part of the project considers the possibility of transferring technology from ICT-115 to a new set of coordinated courses in Vocational Literacy that include courses in technology, English and computing. Vocational Literacy is a new academic field that is arising in response to criticism from industry that vocational graduates are not sufficiently literate to perform on the job. "Literate" as used in this sense is somewhat vague term but is thought to include verbal and written communication skills, high order independent reasoning skills and basic computer literacy, each with a workplace orientation. A review of the literature reveals that high quality research into improved vocational literacy through coordinated courses in technology and English has been going on for some time. The program described here appears to be unique in that it would coordinate computer literacy with english and with technical courses. The purpose of this report is to explore the feasibility of such a 3-way coordinated curriculum in workplace literacy.

The following questions about the transfer of the technology from ICT-115 to such courses and about the development of such courses are addressed in this part of the report:

1. Which technical, English and computer courses should be coordinated?

2. How should English and computer courses be coordinated?

3. What should be taught in the English courses?

4. How should English and technical courses be coordinated?

5. What techniques should be used to assess students English skills for the purpose of initial and ongoing placement in selected courses?

6. What teacher qualifications are required for these courses?

7. What kinds of teacher development programs are necessary to support these courses?

THE PROGRAM

1. Which technical, English and computer courses should be coordinated?

A. English Courses

A Boeing funded project in Applied Academics (see Appendix VI) is redefining English courses for vocational students at all three Seattle Community College Campuses. At this time, the first course, English 105, is being modified on all 3 campuses to include Applied communications methods and to be the same course on all 3 campuses. At South Seattle Community College a 3 quarter program of Applied Communications is planned.

The first course, English 105, will be the normal entry point course in the series and will emphasize basic skills in grammar. The second course, English 106, will continue the emphasis on grammar and will introduce vocational writing. The Third course, English 108, will focus on report writing and public speaking relative to a technical "capstone" project. A fourth course, English 103, will be added in the future. 103 will be a remedial course for those not qualified to begin 105. These courses are ideal candidates for inclusion in the coordinated course project because the detailed curriculum for each course is still being formed and because of their focus on Vocational English.

B. Computer Courses

At this time, all vocational students in technical programs are required to take one course in computing, ICT-103, "A Software Sampler", in most cases. In addition some technical programs require a second course in computing. A version of ICT-103 or a replacement course is therefore the logical choice for inclusion as the coordinated computer course.

C. Technical Courses

The above English courses are intended to be taught in the first year of instruction with the exception of the "capstone" course which will be taught at the end of the second year.

Students would normally begin with the second course in Winter quarter of the year followed by the third course in Spring quarter the first year. Students requiring remediation would start in the Fall quarter of the first year.

This scheduling suggests that technical courses normally run in the Winter and Spring of the first year would be logical choices for inclusion in this project.

2. How should English and computer courses be coordinated?

The coordination of writing courses with computer courses has been explored in ICT-115 as shown in Appendix I. In the project it would be logical to couple a variation of ICT-115 together with the first English, English 105, in the Winter, to form a 6 credit coordinated package. The curriculum for the combined course could follow the ICT-115 design which already includes "vocational" subject matter in the form of business memos, letters and reports. This vocational subject matter could be easily tailored or replaced with other vocational program specific items without changing the basic design of the course. An alternative would be to run ICT-115 in the Fall with English 103, if English 103 becomes the more common entry point.

3. What should be taught in the English courses?

The content of the English course will depend on the English proficiency of the student.

ENGLISH 103

Low English proficiency students will start in the English 103, the remedial course which could focus on basic workplace communications competencies and the basics of grammar as described in Appendix II "Workplace Literacy Core Curriculum..." as follows. The workplace competencies identified in this document are:

Job Performance

1. Identify products.
2. Describe production process.
3. Follow instructions to carry out a simple task.
4. Respond appropriately to supervisor's comments about the quality of work on the job, including mistakes, working too slowly and incomplete work.
5. Request the supervisor to check the work.
6. Report completion of the task to the supervisor.
7. Fill out a production form to indicate work done.
8. Request supplies.
9. Ask where an object is located.
10. Follow and give simple oral directions to locate an object or place.
11. State a problem and ask for help as necessary.
12. Respond to inquiry as to nature of the current task; state amount and type of work already completed.
13. Identify substandard products and identify the reasons.

Clarification/Verification

1. Clearly state that something has been/has not been understood.
2. Repeat to verify that something has been understood.
3. Ask someone to repeat more slowly or to repeat something.

Work Schedule/Time Sheet/Paychecks

1. Read and fill out time sheets.
2. Read gross pay, net pay and deductions on paychecks.
3. Report errors on paycheck or piecework form.
4. Respond to request to work a particular shift or schedule.

Safety

1. Read basic safety signs.
2. Fill out an accident report form.

General Work Related

1. Give appropriate reason for absence or tardiness in person or on the phone.
2. Orally or in writing, request permission to take time off or to leave early or to change a work schedule.
3. Read a job announcement.
4. Orally or in writing, apply for a job promotion or transfer.

Social Language

1. Initiate and respond to greetings and farewells.
2. Ask and answer simple questions about personal background and family.
3. Ask and answer simple questions about daily activities, weekly routines, and weekend activities.

General Company

1. Read a job description.
2. Read a production ticket.
3. Read a production form.
4. Read a memo.

ENGLISH 105

Students who qualify for this entry point course would be taught the fundamentals of vocational writing. Students would be required to maintain course journals for each coordinated vocational course, would write one microtheme per week and would be given writing assignments in lab reports as appropriate. The use of course journals, microthemes and lab reports is described in Appendix III "The Best of Both Discourse Worlds: A Two-Tiered Writing Program for the Community College Technology Curriculum." Students in this course which would be coordinated with the computer course would also be given instruction in the use of computers as described in Appendix I and would begin to produce a formal report by the end of these courses.

ENGLISH 106

The third course in English will cover more advanced modes of thinking and report writing including "Critical Analysis and Problem Solving" as mentioned in Appendix III.

ENGLISH 108

The fourth course will focus on a verbal and written report on the "capstone project."

4. How should English and technical courses be coordinated?

The coordination of technical subject matter and English is addressed in several places in this document.

The coordination of the basic workplace literacy skills with English grammar is shown in the samples included in Appendix II. In general, each workplace "competency" is coupled with a "Grammatical Structure" in an instructional unit as shown in the following exhibit.

INSTRUCTIONAL UNIT

Competency:	JP-6 Report completion of a task to a supervisor.
Situations:	A worker tells his supervisor he finished a job.
Materials:	Regalia - company products, tools.
Vocabulary:	"Finished, done, check, right, wrong."
Grammatical Structures:	Modals - could (request), can
Core Interchange:	Worker: "Barbara,_____ Barbara: "I'll check it. If its's OK, you can _____."
Company Specific Interchange:	Painter: Denoyer-Geppert Loot: "Barbara, I finished painting the heart. Barbara: "I'll check it. If it's OK, you can start with the eye."

The coordination of technical subject matter with the writing of course manuals, microthemes and lab reports is discussed in Appendix III.

The coordination of technical subject matter with the writing of formal reports is discussed in Appendix I.

5. **What techniques should be used to assess students English skills for the purpose of initial and ongoing placement in selected courses?**

The subject of English skills assessment is discussed in documents listed in Appendix IV "English Literacy for Non-Literate Secondary LEP Students. Updated April, 1990. Section II Testing and Assessment." It is believed that a simple approach to this issue exists. All students could be asked to demonstrate some of the workplace literacy skills identified in the remedial course. Those unable to do so would be remediated, those able to do so would start in the second course. On going placement would be a simple matter of either passing or failing each of the final three courses, taken in sequence. Such a simple approach could be used until a sophisticated standardized national instrument such as that described in Appendix XVI page 3 becomes available.

6. **What instructor qualifications are required for these courses?**

Technical instructors must place a high priority on teaching students to think and to communicate.

In order to teach the above English courses, instructors should be conversant with the state-of-the-art in computer aided writing and should be qualified in the vocational subjects in addition to competency in teaching traditional English courses.

Computer instructors must be conversant with the state-of-the-art in computer aided writing.

7. **What kinds of instructor development programs are necessary to support these courses?**

A new instructor training program in Vocational English Instruction would be required. The program would include a one quarter 5 credit course in Computer Aided Writing coupled with a 3 credit practicum in a vocational subject area. In the practicum English instructors will develop tools to be used in coordinated English assignment including course journal formats, microtheme topics, lab notebook formats, report topics and vocabulary lists under the direction of the assigned vocational instructor.

Computer teachers world be required to complete the computer assisted writing course.

Vocational Instructors should complete a 1 quarter, research project base course in vocational literacy.

CONCLUSION

This concludes a description of the three-way coordinated course program in Vocational Literacy. Based on the above review such a program appears feasible and timely. It is recommended that a committee be created to develop detailed curriculum for the above courses for implementation in Winter quarter 1992 and that that committee consider the work presented here.

APPENDIX I ICT-115 COURSE DESCRIPTION

Computer Aided Writing: An Emerging Field

by George Neff Instructor in Computing
with Roger Bourret Instructor in English-as-a-Second-Language
and Randy Nelson Instructor in Library Science

SOUTH SEATTLE COMMUNITY COLLEGE
Seattle, Washington

SUMMARY

In a time when the nations' education system is desperately searching for improved methods and in an era of rapid and sustained technological development exploration of the application of technology to all facets of learning is essential and opportunities for improvement abound. This article describes the work of one small band exploring the intersection of education and technology.

Emerging technology is changing the processes of writing and of teaching others to write. The availability of enhanced word processors, *style checkers, **grammar checkers, CD-ROM based reference tools and on-line databases for research work are raising new questions that must be answered by those who use the computer as a tool for writers.

A team of instructors at South Seattle Community College in Seattle, Washington has developed an experimental writing course that uses emerging technology that includes some new technology developed by the team. This experimental course is attempting to identify and to deal with questions about the use of technology in writing and in teaching others to write. Some of these questions include:

- **What types of writing courses, for example, college creative writing courses, English as-a-Second-Language (ESL) writing courses, technical writing courses, business communications courses, etc. are best suited to the use of particular technologies?**
- **How can the quantitative data provided by *style checkers best be used to plan documents?**
- **Do students have a positive or negative reaction to computerized writing tools? If student reactions differ, what are the key variables?**
- **How can the quantitative data provided by *style checkers and the comments provided by **grammar checkers best be used to analyze writing styles, to set and achieve goals for improvement in writing and to monitor progress toward goals?**
- **Are technical students better motivated in learning to write in technologically rich writing environment?**
- **Do **grammar checkers help or hurt students? Are they best used on-line or off-line? Which ones are the best? Do they work equally well for native speakers and for ESL students? Is this technology mature, stable and accurate enough for classroom use?**

*** Style checkers provide quantitative data about a word processing document.**
****Grammar checkers provide comments about suspected grammar errors in word processing documents.**

The South Seattle team is most anxious to share their work with others in order to find further answers to these questions. This article describes the course and the teams experience in dealing with the above questions.

Background

Several points need to be set before describing the course details.

First, the course, as designed, was not intended to be a typical college transfer course in creative writing. The course was designed for students pursuing terminal two year degrees in technology, many of whom are non-native speakers. The intent of the course was to teach these technical students to find, organize and effectively communicate business related information to a typical business audience to inform or persuade that audience. The course also differs from traditional technical writing and business communication courses because of the emphasis on the use of state-of-the-art technology while writing. The course might best be described as a course in vocational literacy using emerging technology. The team is exploring the use of technology in ESL, College Transfer and other vocational literarcy writing courses as this article is being written. The preliminary indications are that the use of technology may differ widely depending on the course. Caution in the application of our experience to other types of courses is therefore encouraged.

Second, while the course has served to focus attention on several critical questions about the use of technology in writing classes, it has not provided strict answers to these questions. Such answers simply cannot exist because the final assessment of the quality of a piece of writing is always subjective and because improvements in writing cannot be easily traced to any of the many things that influence writing quality. Disagreements on the questions raised by the course exist even among project team members. Our intent in writing this article is to share our experience with the course and the questions involved with others and to encourage others to share with us so that we may each find our own answers to these important questions.

The course evolved as follows. The 1991 Winter Quarter was approaching and a new course was scheduled to begin, Computer Report Writing or ICT-115.

ICT (Industrial Computing Technology) is a technical education offering with tracks in programming, software applications, and software sales. The director of technical education had revised the computing curriculum the year before with 115 in the new line up. ICT-115 was one of several courses intended to improve the literacy of technical students. One goal of 115 was to capture the interest and the imagination of technical students in the process of writing by using emerging technology. The course also had the goal of identifying the impacts of an emerging technology on writing and on teaching others to write. The detailed curriculum, had not been developed and time was running short.

The first step in the development of a detailed curriculum was to assemble a team capable of implementing the course. Fortunately, two faculty had been teamed earlier in a similar effort. A veteran English-as-a-Second-Language instructor and an instructor in computing were team teaching an introduction to computers to ESL students. This team was an ideal nucleus for the project because of the mix of skills of the instructors and their record of success in a similar course. This team was enhanced by the addition of an instructor in library science who is also the colleges' resident expert in CD-ROM technology and on-line literature searches.

The second step in the creation of the course was to survey emergent technology for possible

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inclusion. The technology selected included structured design techniques, word processors, *style checkers, **grammar checkers, CD-ROM based reference and research tools and research using on-line databases.

With the technology identified and the instructing team in place it was possible to start building the course.

A review of the target technology and traditional text books on writing revealed three appearent gaps in the array of computer related tools available for writing courses.

The first gap was in document planning. In the field of software engineering and in other technical fields, product planning is a quantified process that is often based on computerized models and graphic tools. The planning of written products, on the other hand, is often less quantified and graphic. Because technical students tend to prefer quantification and graphics the team has included new document planning tools based on software engineering methods. These tools that are described under Phase 1 Document Design were developed by the team for the course.

The second gap was in the area of quantitative document analysis. The *style checkers reviewed by the team produced an excellent range of quantitative data about a single document. These *style checkers were originally developed as editing tool for use on individual documents by a single editor not as tools for instructors in writing courses. It is therefore not surprising that neither data comparing one writer to several other writers nor data comparing one document to other documents was readily available from the software. This appeared to be a serious opportunity loss in an area where technology was beginning to promise new insight and possibly improved methods. *Style checkers produce very interesting objective, quantitative data about documents. This data includes such things as the average number of words per sentence and the average number of syllables per word. The instructors felt that if this data proved useful for instruction, then data comparing one student to another and data comparing a students' trends over several documents would be even more useful for teaching purposes but the products reviewed did not offer such data. This gap has been filled with software developed by the team that takes individual document level data produced by the *style checker and builds files that contain class level data by assignment and assignment data by student. This software is described in later sections.

A third gap noted by the team was a missing link between problems flagged by the **grammar checker and some standard reference book on English. GRAMMATIK, the **grammar and *style checker used in the course, is said to be based on the Chicago Manual of Style, but problems identified by the **grammar checker are not cross referenced to the manual. This is very unfortunate because students are often baffled by the necessarily cryptic comments produced by the **grammar checker. It would be very useful if the comments included a page number or section reference to the Chicago Manual of Style, or ever better, to a standard business correspondence manual like the Gregg Manual that we use in our course. This would facilitate the coding of grammar problems with unique identifiers that would enrich the value of the **grammar checkers output immensely. An obvious non-exclusive alternative to this approach would be to have the Chicago Manual of Style on a CD-ROM product such as Microsofts' Bookshelf. The **grammar checker could then 'flip' the user into the style manual for details at the request of the user then 'flip' back into the process of interactive grammar checking. This gap was beyond the ability of the team to remedy but these suggestions have been passed on to the makers of the **grammar checker.

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The Course

The course is designed to accommodate 24 students for one hour per day, five days per week for an 11 week quarter. The course is run in a classroom with 24 computers, one per student, and is organized into five more or less overlapping phases. Each phase is defined by a unique combination of sub-topics, assignments, instructors, tools, and techniques. The five phases of the course include Document Design, Document Production, Assessment and Goal Setting, Practice and Remediation, and the Reference and Research phase.

Phase 1 Document Design

Phase 1 Document Design starts on day one and is one of two main topics for the first two weeks of the course. Document Design activities continue throughout the course. The discussion of document design includes document specifications and document organization. The principal instructor in the Document Design Phase is the computer instructor because the document planning methods taught in the course are largely borrowed from software engineering.

Students create one document per week during the course and prepare a written plan for each document. The first two documents assigned are a business memo and a business letter. Document plans are developed in two parts; the document specifications and the document organization plan.

The specifications for the document include a format, a subject concisely stated, a statement of purpose, a definition of the expected audience, and a target grade level (see Exhibit 1).

Exhibit 1

ICT-115 Article
Document Specifications

Format:	Journal Article
Subject:	ICT-115 Experience and Questions
Purpose:	Share and Encourage Research
Audience:	College Faculty, Trade, Administrators
Grade Level:	12

The document organization plan is based on quantitative document planning standards. The use of quantitative document planning standards in writing courses is relatively new in the instructors' experience. The basic quantitative document planning standards currently used in the course are a target grade level of tenth grade with sentences that average 15 words in length, words that average 1.7 syllables per word and paragraphs that average 3 to 5 sentences. The tenth grade level seems appropriate for a general business audience. The sentence and word standards have been developed based on experience with the course and will result in the target grade level using the Flesch-Kincaid Grade Level scale. The paragraph standard is based largely on the fact that students often start the course writing one or two sentence paragraphs.

(Please note that these quantitative document planning standards are different from individual student writing goals as discussed in Phase 3. Individual students may have goals that differ dramatically from these document planning standards depending on where the student is in their writing style.)

As mentioned above quantitative document planning standards are used to develop a document organization plan in the form of hierarchy charts. Hierarchy charts are graphic representations of document organization (see Exhibit 2 on the following page.)

The basic element on the hierarchy chart is a paragraph. Students are taught to calculate the estimated number of paragraphs for a given document in the following way. Students are given a target document length in words (i.e. 250 words) or pages (with 250 words per page) and are then taught to convert this to a number of paragraphs. The objects ("objects" in the language of software design are equivalent to "main topics" in plain English) of the document and the relationships among the objects (main topics) are then identified and represented as paragraphs on a hierarchical organization chart. Sub-objects (sub-topics) are attached to appropriate main topics and so on until the chart is complete. Students then analyze the relative emphasis given each topic and sub-topic, the relationships among them, alternative organization schemes and then finalize the document organization plan.

Document planning includes the traditional functions associated with document creation such as thinking about the subject, deciding what to say, finding a voice, and composing; however, the emphasis in this phase is on the use of quantitative standards and graphic planning tools. It is assumed that the former subjects are emphasized in more traditional writing courses.

Tools and technology used for this phase of the course are the Gregg Manual, which is used for document format guidelines, and the document specification forms and hierarchy charts developed by the team for this course.

Phase 2 Document Production

The second phase of the course is document production. This phase starts when the first document plan is completed and continues for the balance of the course. The sub-topics included in the production phase are the use of DOS and WordPerfect. The students are given just enough information about DOS and Wordperfect to get started and to use the WordPerfect "Help" function. Emphasis is put on learning through self-help and peer support. Keyboarding skills are assumed but not required. The primary instructor for this phase is also the computer instructor.

Assignments associated with this phase include the production of the business memo and the business letter planned in Phase 1 and all subsequent documents produced in the course. The primary tools for this phase are the word processor with DOS and the personal computer and printer.

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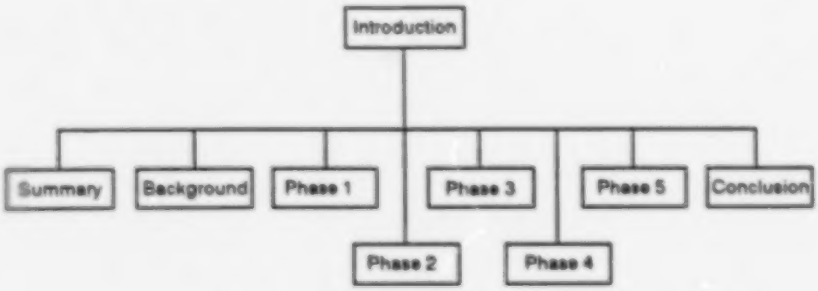
Exhibit 2

ICT-115 Article

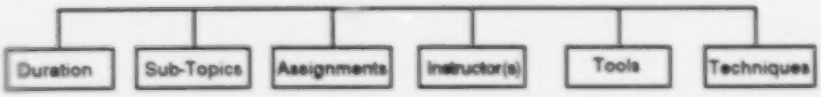
Document Organizaiton Plan

and

Hierarchy Chart



(Repeat This Subset For Each Of The Above Phases)



Note: Each box on this chart represents one paragraph. This was the original plan for the ICT-115 article. If each 39 paragraphs were 4 sentences on average and if each were 20 words on average then the artilce would have been 3120 words long. The difference between this plan and the actual shown in exhibit 3 is the addition of paragraphs dealing with the questions associated with the course. These were not forseen in the original plan.

Phase 3 Assessment and Goal Setting

Phase 3 begins after the first two assigned documents are produced and continues for the balance of the course.

This phase includes an informal self-assessment by the students, an assessment of each student's document planning skills, an automated assessment of style using a *style checker, an automated assessment of grammar using a **grammar checker, a comparative style assessment, which also uses the *style checker, and a qualitative assessment of each students writing skills. The qualitative assessment is conducted by the English-as-a-Second-Language instructor.

Following the assessment process, three individualized writing improvement goals are set for each student. Students perform self assessments as a writing exercise in which they are asked to identify their writing deficiencies. The computer instructor assesses each student's skills at preparing and following the document plans and processes each students first two assignments with GRAMMATIK, a *style checker and **grammar checker, and with some software developed for this course. GRAMMATIK produces four kinds of outputs that are used in the course.

The first GRAMMATIK output is an interliniated copy of each original document that identifies possible grammar errors and provides some ideas about correcting them. This is the output that could be enhanced immensely by the addition of error codes and cross references to a manual such as the Gregg Manual for students who need explanations and examples beyond the necessarily brief comments from the **grammar checker. This is also an area where students attitudes toward automated *style and **grammar checkers are shaped. If the student sees the **grammar and *style checker as an 'informer' used by the teacher to catch deficient students then students will not be comfortable using the tool. Care must be exercised to convince the student that the *style and **grammar checker are tools for student use and are intended to help them.

The second output of GRAMMATIK is quantitative data about each students work, examples are shown in Exhibit 3 on the following page.

This quantitative data is used as input to the instructional software developed for the course that provides comparisons of each students work. These comparisons are of two types. The first type of comparison compares students to one another on a given assignment. This is useful for determining the range of styles represented in the class and overall averages. The second type of comparison compares assignments for a given student. This is useful for assessing trends in a given students writing style. The data contained in Exhibit 3 that has proved most useful so far is the data about grade level, average words per sentence, average syllable per word, and average number of sentences per paragraph. This data, like all data, requires careful interpretation by a competent professional, otherwise it can be misleading. As an example, one student may receive a twelfth grade level writing score while another student receives a grade level eight. On the surface, who is the better writer? This is where skill in data interpretation is required. An analysis of the grade level 12 writer may show that this students long sentences tend to be run on sentences of non-parallel construction and that bigger words tend to be used inappropriately while a similar analysis of the 'eighth grade' writing shows that it is clear and well formed.

The third and forth types of outputs produced by GRAMMATIK include word profiles and interactive screen outputs. These will be discussed later.

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Computer outputs, self assessments, and planning skills assessments are then used to inform a subjective assessment of each student's overall writing skills.

Once the students have received some feedback on their writing from the computer instructor, the English-as-a-Second-Language instructor, and the *style checker and the **grammar checker, they are asked to list three goals to improve their writing. The English-as-a-Second-Language instructor also makes up a list of goals for each student. The student and teachers have a conference in which they review the feedback and lists and then make up a final set of goals.

These goals vary because of the varying levels of the students. The purpose of the goal-setting is to help the student focus on a few points about his or her writing and to monitor these points consistently. The monitoring can be done by the student, the teacher(s), or the *style or **grammar checker, depending on the goal.

Goals usually include quantitative goals. Such quantitative goals will typically include a goal for average words per sentence and for average syllables per word. Grade level goals as such are not used because they are too gross, that is there are too many combinations of words per sentence and syllables per word that will result in a given grade level. Students are, as often as not, given goals to lower the average words per sentence and to lessen the average syllables per word though this is counter intuitive. Goals of this type are common because some students tend to write run on sentences or non-parallel sentences and use inappropriately big words. The easiest way to correct these problems in the short term is to encourage students to use shorter sentences and simpler vocabulary to gain control over their writing. It should be noted that once these students demonstrate control of less complex styles and an understanding of the elements of more complex style their goals might change direction. The opposite cases are also true. Other students need to be encouraged to increase their vocabulary and to use larger words when larger words do a better job of conveying meaning and some students need to be encouraged to expand on ideas in longer sentences. Goals also may include more traditional non-quantitative goals such as goals related to subject verb agreement, use of passive voice and so on.

Exhibit 3

Quantative Data Produced by
the Grammatik IV Style Checking Function

Statistics for:	A:\geos.fin
Problems marked/detected:	0/261
Readability Statistics	
Flesch Reading Ease:	43
Gunning's Fog Index:	16
Flesch-Kincaid Grade Level:	13
Paragraph Statistics	
Number of paragraphs:	73
Average length in sentences:	3.2
Sentence Statistics	
Number of sentences:	237
Average length in words:	20.9
End with '?':	13
End with '!':	0
Passive voice:	80
Short (< 14 words):	69
Long (> 30 words):	46
Word Statistics	
Number of words:	4972
Prepositions:	645
Average length in letters:	5.20
Syllables per word:	1.68

It is recognized that the use of quantitative goals in teaching others to write is new and potentially controversial and that the preceding discussion does not do justice to this important subject. The team feels that this subject is important enough to deserve a separate article and one is being written.

Once the goals are set models or references are provided to help the student monitor their progress. The Gregg Manual, GRAMMATIK, sample sentences or paragraphs, and teacher input guide the student. Students who use *style checkers to monitor progress in style usually see this activity as fun and rewarding. Students who use **grammar checkers in an interactive mode to correct grammar are usually frustrated until they are taught to understand that **grammar checkers are sometimes better at finding problems then they are at diagnosing problems, that some things that appear to be problems to **grammar checkers are not problems, and until they are taught to use a reference manual on grammar to find more help on an alleged problem when they need it.

The students use of a **grammar checker, specifically of GRAMMATIK has been the area of greatest controversy in the course. Two questions seem to dominate discussions of this topic. Is GRAMMATIK "the best" **grammar checker and are **grammar checkers actually harmful or confusing to students? Our answers so far to these questions have been somewhat pragmatic. About the first question, GRAMMATIK appeared to be the most popular product of its type and we could not afford the time or money to test alternatives at the time we purchased the software for the course. Some authors have argued that superior checkers exist (see George L. Findland. "Style Editors: A Review." In *OnLine, A CAI-CMI Journal for Community Colleges* (Winter 1991)) and we do plan to test two more in the 1991/1992 school year. Our answer to the second question was purely pragmatic. We reasoned that people are using **grammar checkers, like it or not, and so we may as well teach them how to get the most out of these products. Our subsequent experience suggests that we made a good decision on this point. Again it must be stated that our experience suggest that **grammar checkers are a net liability to students unless they are taught that **grammar checkers are sometimes better at finding problems then they are at diagnosing problems, that some things that appear to be problems to **grammar checkers are not problems, and that one must be able to use a reference manual on grammar to find more help on an alleged problem when more help is needed.

This is also an area where the students attitudes' toward the technology will vary greatly depending on the depth and quality of instruction they are given.

After the course an assessment is made by the student as well as the teachers about the attainment of the student writing goals. One course goal is to provide students with a point of view from which they can judge their writing. Consistent monitoring of progress on their goals promotes this objective.

The tools and techniques used in this phase include GRAMMATIK, the instructional support software developed for this course, the Gregg Manual, and supplied writing samples.

*** Style checkers provide quantitative data about a word processing document.**
****Grammar checkers provide comments about suspected grammar errors in word processing documents.**

Phase 4 Practice and Remediation

Phase 4 starts when individual writing goals are set and runs for the balance of the course. The students continue to produce weekly assignments that are sections of a business plan. Each week students produce different sections of the plan beginning with a Title Page and a Table of Contents; then a Marketing Section, a Products or Services Section, and an Operations Section. Ambitious students also include transmittal letters, prefaces, financial statrments, and so on.

Assignments are evaluated using the same approach outlined in phase 2. The major difference in assessment in Phase 4 and beyond is that students process their documents using GRAMMATIK in an interactive mode.

The remediation program is based on the initial and on going assessments. Remediation occurs on two levels, the class level and the student level. Some class level remediation is divided between what the team has come to see as the two most distinct types of writers in the course those who tend to write long complicated sentences using lots of big words, and those who write short, often choppy, sentences using small words. This division grew out of an analysis of the writing of the students on the two extremes of the comparative quantitative analysis. Class level remediation for those who write long sentences includes topics like parallel construction and run on sentences. Class level remediation for those of few words includes lessons on the use of connectives and techniques for expanding on basic ideas.

Other class level remediation includes such common skills as techniques for changing from passive voice to active voice and the use of the WordPerfect Thesaurus with the GRAMMATIK word profile function to raise or lower the average syllables per word in a document. The word profile function in GRAMMATIK produces several different kinds of lists of words appearing in a document and a frequency of occurrence figure for each word. These lists and the Thesaurus contained in WordPerfect are used to identify synonyms for words that appear frequently in the document. Students are taught to seek longer or shorter replacement words depending of their quantitative goals. The students are also taught to use English language dictionaries to find precise definitions and to assess the suitability of candidate synonyms. Once selected, synonyms are incorporated in documents in italics using the find and replace function. Replacements are entered in italics to speed up editing by the instructors. The instructors will then comment on the suitability of selected replacements.

This process can be seen as controversial. It is possible for teachers to place inappropriate emphasis on the size of a synonym and not enough emphasis on selecting synonyms to improve clarity or precision. On the other hand the potential for misuse of synonyms exists with or without automation and the team feels that making the process of synonym selection visible provides an opportunity for instruction, practice and review in a critical area.

Individual level remediation and document level remediation includes the interactive use of GRAMMATIK by the students, the use of the Gregg Manual for the further analysis of problems identified by GRAMMATIK, the use of English language dictionaries for synonym analysis and individual consultations with the instructors.

The principal focus of the practice and remediation phase is to measure and enhance student progress against the individual writing improvement goals set after phase 3.

*** Style checkers provide quantitative data about a word processing document.**
****Grammar checkers provide comments about suspected grammar errors in word processing documents.**

Phase 5 Reference and Research

In Phase 5 students are introduced to the reference and research functions using traditional hard copy reference and research tools, CD-ROM, and on-line database media. Students are first exposed to traditional hard copy reference and research tools. Each student then completes two assignments using the newer technology.

The first assignment is to obtain four items from two Microsoft CD-ROM products called Bookshelf and Stat Pack. Bookshelf includes 10 standard references on one disc including Roget's II:Electronic Thesaurus, The American Heritage Dictionary, Houghton Mifflin Spelling Verifier and Corrector, Houghton Mifflin Usage Alert, Chicago Manual of Style, The World Atlas, Bartlett's Familiar Quotations, Business Information Sources, a ZIP Code Directory, and a Forms and Letters Directory.

Stat Pack includes U.S. government business statistics in narrative and column oriented formats.

In the first assignment each student obtains a quotation from Bartlett's, the definition of three key words from the dictionary, a list of sources of information about their business from BIS and data about their industry produced by the U.S. government from Stat Pack.

In the second assignment, students use one of the 385 computerized databases available through Dialogs' on-line reference service to peruse some 200 million records contained in these databases for information about their business plans. This may seem like a very expensive process but Dialog has a exceptionally fine program for introducing students to the use of their service. Students in a course may use the Dialog service at a substantially reduced rate, say $16 per hour instead of around $50-$200 per hour for commercial users. Our experience is that well designed searchs can be completed in 15 minutes or about $4 per student. The team encourage others to take advantage of this great program.

Students are helped in these assignments by the instructor in Library Science. In the performance of the assignments' students are taught the strengths and weaknesses of each media, how to select among them, how to design searches and how to size potential search results.

The control programs for the CD-ROM products used for the assignments are memory resident. This permits students to switch from their plans that are WordPerfect documents, to a CD-ROM source, copy data from CD-ROM, switch back to WordPerfect, and paste the data into the plan with elegant simplicity.

The on-line databases are accessed by telephone and modem. Selected data is captured in ASCII format on diskette and then is copied into the plan as a separate step.

The issues of the potential for copyright violation and of encouraging plagiarism by the students sometimes come up when discussing this phase. The team has operated on the assumption that since CD-ROM and Dialog output are used only for student assignments that there are no copyright issues. The team also tries to stress the importance of attributing quotes to sources.

Students are amazed at the amount of information available to them and are happy and excited about the ease of finding and incorporating information using these new methods, particularly in comparison to classic seek, copy and retype methods.

The information obtained in these assignments is first incorporated into the business plans in appendices created for this purpose and later used elsewhere in the plan as the student chooses.

This phase includes the use of the PC, CD-ROM, the Microsoft CD-ROM products mentioned, a modem, data communications software, and the Dialog database service.

Conclusion

ICT-115 is still evolving, but it is believed that the course has at least partially met the goal of capturing the interest and imagination of technical students in writing with emerging technology. The best support for this conclusion is the work produced by the students and their comments about the course. The work produced by the students shows a definite improvement over the term of the course in the opinion of the instructors. Some more obvious areas of improvement are in the production of documents that are well organized and focused, properly formatted, relatively free of spelling errors. The students documents also use passive voice intelligently, meet grade level targets, avoid choppiness and avoid excess complexity. The students' comments about the course suggest that they see it as relevant to their future employment, exciting, informative and fun.

The course has also partially met the goal of identifying the impacts of technology on writing and teaching others to write. The course has forced out and focused attention on crucial questions about some impacts of the selected technology on one type of writing course but much remains to be done. The team hopes that others will join in this effort and that national policy will recognize and support ongoing inquiry into the application of emerging technology to problems in education.